



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : C12N 15/12, C07K 14/47, A61K 38/08, 38/10, 38/17, C12N 15/11, 15/86, C07K 16/18, C12Q 1/68, A61K 35/14, A01K 67/027, C12N 5/08</p>	A3	<p>(11) International Publication Number: WO 99/18206</p> <p>(43) International Publication Date: 15 April 1999 (15.04.99)</p>
<p>(21) International Application Number: PCT/US98/19609</p> <p>(22) International Filing Date: 21 September 1998 (21.09.98)</p> <p>(30) Priority Data: 60/061,428 8 October 1997 (08.10.97) US</p> <p>(63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 60/061,428 (CIP) Filed on 8 October 1997 (08.10.97)</p> <p>(71) Applicant (for all designated States except US): THE GOVERNMENT OF THE UNITED STATES OF AMERICA, represented by THE SECRETARY, DEPARTMENT OF HEALTH AND HUMAN SERVICES [US/US]; Office of Technology Transfer, National Institutes of Health, Suite 325, 6011 Executive Boulevard, Rockville, MD 20852 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): WANG, Rong, Fu [US/US]; 4949 Battery Lane #409, Bethesda, MD 20814</p>	<p>(US). ROSENBERG, Steven, A. [US/US]; 10104 Iron Gate Road, Potomac, MD 20854 (US).</p> <p>(74) Agents: FEILER, William, S. et al.; Morgan & Finnegan, L.L.P., 345 Park Avenue, New York, NY 10154 (US).</p> <p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p> <p>(88) Date of publication of the international search report: 5 August 1999 (05.08.99)</p>	
<p>(54) Title: HUMAN CANCER ANTIGEN NY ESO-1/CAG-3 AND GENE ENCODING SAME</p>		
<p>(57) Abstract</p> <p>The present invention discloses the identification, isolation and cloning of a gene encoding a novel cancer antigen NY ESO-1/CAG-3 and peptides thereof derived from various open reading frames from the NY ESO-1 gene. The novel cancer antigen and peptides are recognized by cytotoxic T lymphocytes in an HLA restricted manner. The products of the gene are promising candidates for immunotherapeutic strategies for the prevention, treatment and diagnosis of patients with cancer.</p>		

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INTERNATIONAL SEARCH REPORT

national Application No
PCT/US 98/19609

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 C12N15/12 C07K14/47 A61K38/08 A61K38/10 A61K38/17
C12N15/11 C12N15/86 C07K16/18 C12Q1/68 A61K35/14
A01K67/027 C12N5/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C07K C12N A61K C12Q A01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CHEN Y -T ET AL: "A TESTICULAR ANTIGEN ABERRANTLY EXPRESSED IN HUMAN CANCERS DETECTED BY AUTOLOGOUS ANTIBODY SCREENING" PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, vol. 94, March 1997, pages 1914-1918, XP002064909	1-4, 6-13, 15-18, 20,21, 23,28, 29,32-35
Y	see figure 3	30,31, 39-48, 53-66
Y	WO 97 29195 A (US HEALTH) 14 August 1997 see whole document, particularly the claims.	30,31, 39-48, 53-66

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search

26 May 1999

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04.06.99

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INTERNATIONAL SEARCH REPORT

national Application No

PCT/US 98/19609

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	VAN ELSAS, A. ET AL.: "Transformation of IL-2 augments CTL response to human melanoma cells in vitro: immunological characterization of a melanoma vaccine." JOURNAL OF IMMUNOTHERAPY, vol. 20, no. 5, September 1997, pages 343-53, XP002096030	28-31, 60,62, 67-69
A	see abstract; figures 6B,7	40,41, 48,53, 54,59,61
A	<p style="text-align: center;">---</p> PARKHURST, M.R. ET AL.: "Improved induction of melanoma-reactive CTL with peptides from the melanoma antigen gp100 modified at HLA-A*0201-binding residues." JOURNAL OF IMMUNOLOGY, vol. 157, 1996, pages 2539-48, XP002096010 see the whole document	
P,X	<p style="text-align: center;">---</p> WO 98 14464 A (LUDWIG INST CANCER RES) 9 April 1998	1-4, 6-13, 15-18, 20,21, 23, 28-35, 39-41, 43-63, 65,67
	see whole document, particularly the claims	
P,X	<p style="text-align: center;">---</p> WO 98 32855 A (GODELAINE DANIELE ;LETHE BERNARD (BE); LUCAS SOPHIE (BE); SMET CHA) 30 July 1998	1-4, 6-13, 15-18, 20,21, 23, 28-35, 39-42, 53-62, 65,67
	see whole document, particularly the claims	
P,X	<p style="text-align: center;">---</p> JÄGER, E. ET AL.: "Simultaneous humoral and cellular immune response against cancer-testis antigen NY-ESO-1: definition of human histocompatibility leukocyte antigen (HLA)-A2-binding peptide epitopes." JOURNAL OF EXPERIMENTAL MEDICIN, vol. 187, no. 2, 19 January 1998, pages 265-70, XP002096011 see abstract; figure 3	49-52,67

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 98/19609

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

Although claims 60-64 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/ composition.
2. ☒ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 4,11-23,32-35,52,58 to completion and 1-3,6-10,28-31,39-51,53-57,59-69 partially

A cancer peptide comprising seq.ID 4 or portion or derivative thereof, pharmaceutical composition comprising said peptide(s), immunogen comprising one of said peptides, nucleic acids encoding said peptide and portions thereof, expression vector comprising said nucleic acid sequence, host comprising said vector, and method of production of said protein using said host. Also an antibody binding to said protein, a method for detecting the presence of cancer involving assessment of the level of mRNA which encodes said protein, a transgenic animal expressing said protein, a human cytotoxic T-lymphocyte elicited by said protein, and a recombinant virus encoding said protein and optionally an immunostimulatory molecule or a HLA class I molecule, and pharmaceutical compositions of said virus.

2. Claims: 5,24-27,36-38 to completion and 1-3,6-10,28-31,39-51,53-57,59-69 partially

A cancer peptide comprising seq.ID 5 or portion or derivative thereof, pharmaceutical composition comprising said peptide(s), immunogen comprising one of said peptides, nucleic acids encoding said peptide and portions thereof, expression vector comprising said nucleic acid sequence, host comprising said vector, and method of production of said protein using said host. Also an antibody binding to said protein, a method for detecting the presence of cancer involving assessment of the level of mRNA which encodes said protein, a transgenic animal expressing said protein, a human cytotoxic T-lymphocyte elicited by said protein, and a recombinant virus encoding said protein and optionally an immunostimulatory molecule or a HLA class I molecule, and pharmaceutical compositions of said virus.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

It has been noticed that seq.ID 4 is not a true translation of seq.ID 1 and/or seq.ID 2; the latter nucleic acid sequences comprise the arginine encoding codon AGA at bp positions 214-216 of seq.ID 1, whereas the amino acid sequence described in seq.ID 4 comprises a proline residue at the corresponding amino acid - position 43. The search has been carried out for both possibilities.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 98/19609

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9729195 A	14-08-1997	US 5840839 A	24-11-1998
		US 5831016 A	03-11-1998
		AU 1957297 A	28-08-1997
		EP 0882130 A	09-12-1998
WO 9814464 A	09-04-1998	US 5804381 A	08-09-1998
		AU 4349597 A	24-04-1998
WO 9832855 A	30-07-1998	US 5811519 A	22-09-1998
		AU 6042198 A	18-08-1998